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PURPLE VETCH

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Field of Purple Vetch

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FARMERS' BULLETIN 967

UNITED STATES DEPARTMENT OF AGRICULTURE

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PURPLE VETCH is a new crop, promising to prove of special value for green manure in the southwestern United States and as a seed crop in western Oregon.

It is of high feeding value and makes good hay and pasturage.

It is similar to common and hairy vetch, but is less winter hardy than either of these.

Under average conditions it will stand a winter temperature of 15° F. above zero with little or no injury.

Where the temperatures do not fall below 15° F., it should be sown in the fall. With colder winter conditions spring seeding is essential.

Inoculation is advisable in most localities when growing the crop for the first time.

Purple vetch should be drilled in close drills or broadcasted at the rate of 60 to 80 pounds of seed per acre.

Harvesting can be done best with a common mower with a swather attachment. An ordinary thrasher can be used.

The average yield of seed is 12 to 15 bushels per acre.

PURPLE VETCH.¹

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WHERE GROWN. /

PURPLE VETCH was brought into the United States by the Office of Foreign Seed and Plant Introduction in 1899 from Naples, Italy. All introductions since that time have been of the same variety. The crop has been tested most extensively in the Pacific Coast States, where it has given very favorable results. In California in experimental work it has proved one of the best crops, if not the best crop, for use as a green manure, and in commercial plantings it has been thought well of by the orchardists who have used it. In western Oregon and western Washington, experimental work has demonstrated that purple vetch can be grown successfully as a seed crop, and at the present time a limited acreage is being grown in the Willamette Valley of Oregon and the Puyallup Valley of Washington. Purple vetch has not been sufficiently tested in the Southern States to determine definitely its value in localities where common vetch is now being grown. However, as it requires conditions similar to common vetch, it seems probable that it may serve an excellent purpose in this region as well as in the western United States.

DESCRIPTION.

Purple vetch is an annual. It has much the same habit of growth as common vetch.² The length of the stems is usually from 3 to 6 feet. From seven to nine pairs of leaflets, terminated with a tendril, constitute the leaf. The leaflets are long, oval, and covered with down, giving the plant a silvery gray cast. Twenty or more

¹ *Vicia atropurpurea*.

² *Vicia sativa*.

amaranth-purple flowers are borne in numerous conspicuous clusters (fig. 1). The plump, hairy pods, from 1 to 1½ inches in length, contain from four to five seeds of a solid velvety black, with a prominent white scar at the point of attachment to the pod. (Fig. 2.)

SIMILAR SPECIES.

While there are a number of species of vetch that are more or less like purple vetch, the only one grown commercially with which it

might be readily confused is hairy vetch.¹ Both of these species have flowers borne in dense clusters, and the pod and vine characters are more or less similar. The flowers of hairy vetch are more of a bluish purple than those of purple vetch, which tend to a red rather than a bluish cast. Woolly-podded vetch² is quite like the purple and hairy vetches, but is readily distinguished from purple vetch by having pods with very little or no down and a finer stem growth. It is distinguished from hairy vetch by having flowers with a reddish purple cast rather than the bluish purple which is common



FIG. 1.—Stem of purple vetch in flower.

to hairy vetch. The seed characters readily distinguish purple vetch from the hairy and woolly-podded vetches. While the seeds of the two latter species are more or less similar, that of purple vetch can be readily distinguished by the prominent white scar at the point of attachment to the pod.

CLIMATIC REQUIREMENTS.

The climatic requirements of purple vetch are similar to those of common vetch; it is, however, a little less winter hardy. In severe winters in western Oregon purple vetch has been injured more than

¹ *Vicia villosa*.

² *Vicia desycarpa*.

the common vetch, though in no season since it has been planted in that region has it been entirely winterkilled. The winter temperatures that purple vetch will stand vary more or less with other factors, such as snow protection and the amount of moisture in the soil, but under average conditions this crop will stand a temperature of about 15° F. above zero with little or no injury. (Fig. 3.)

SOIL AND MOISTURE REQUIREMENTS.

Purple vetch does best in heavy loams or clay loams, though it has done fairly well on sandy and gravelly soils. It prefers a well-drained soil. In western Oregon in some cases it has done better on low and poorly drained land than common vetch, but in no instance has a good crop been produced under such conditions.

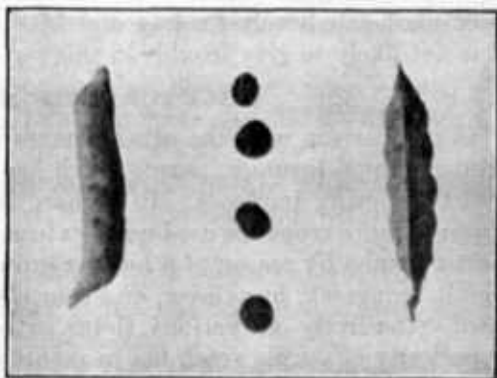


FIG. 2.—Pods and seeds of purple vetch.

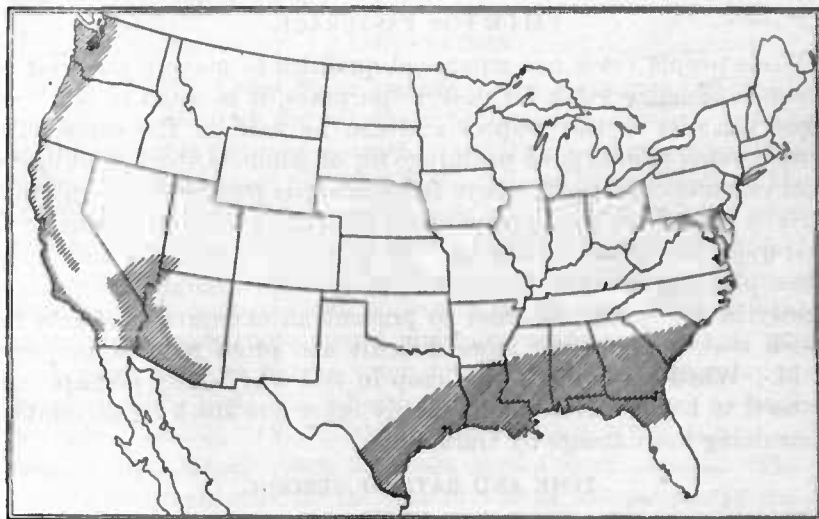


FIG. 3.—Outline map of the United States, with the shaded portions showing the areas where the climatic conditions are favorable for the fall seeding of purple vetch.

VALUE FOR HAY.

Little experimental work has been done to determine the value of purple vetch for hay. Its principal uses thus far have been as a green-manure and seed crop. In incidental feeding tests, live stock have eaten purple-vetch hay readily and seem to relish it as much as

common-vetch hay. Chemical analyses indicate its feeding value to be about the same as common vetch. On account of the heavier hairiness of purple vetch it might seem less desirable for hay than common vetch, but as it is less hairy than hairy vetch, which has been used extensively for hay and with apparently no bad results, it is not likely to give trouble in this regard.

VALUE FOR GREEN MANURE.

In comparison with the other vetches and also with various other winter annual legumes, purple vetch has proved of special value for green-manuring purposes. In orchard sections of California where green-manure crops are used quite extensively, purple vetch has given better results by reason of a heavier growth than field peas, common vetch, fenugreek, bur clover, and sour clover, all of which have been used extensively at various times in commercial plantings. The superiority of purple vetch lies in its ability to make more growth in a cool winter season and thus be ready to turn under at an earlier date in spring. This is quite an important factor in the citrus groves of the Southwestern States, where it is desirable to turn under green manures by the middle of February or not later than the first of March. Aside from the heavy early growth made by purple vetch, the total yield has been large and equaled by few other crops.

VALUE FOR PASTURAGE.

While purple vetch has no special qualities to make it superior to common or hairy vetch for pasture purposes, it is equal to either of these varieties in this respect and can be used in the same way. Purple vetch affords good pasturage for all kinds of stock, and under mild climatic conditions, where fall seeding is possible, if sown quite early it will afford good pasturage in the fall and a large quantity of pasturage the following spring. In growing vetch for a seed crop when planting is made in the fall, it is often desirable to pasture lightly in the spring, in order to prevent an excessive vine growth, which makes harvesting more difficult and often reduces the seed yield. When pasturing a seed crop in this way, sheep perhaps can be used to better advantage than any other live stock on account of their doing less damage by trampling.

TIME AND RATE OF SEEDING.

The time of seeding purple vetch will vary in different parts of the country and also with the purpose for which the crop is to be grown.

In Oregon and Washington west of the Cascade Mountains, purple vetch should be sown in February or March, or as soon as possible after the coldest weather of the winter has passed. Plantings made later in the season will give good results in seasons having a late spring, but in years in which the rainy season terminates early, late plantings are apt to give light yields.

In California west of the Sierra Nevada Mountains, in the southern part of Nevada, and in the southwestern half of Arizona, planting should be done in the fall. Purple vetch is winter hardy in all the milder parts of California and Arizona, and in practically no agricultural area of these States except in the mountain region will the crop winterkill.

When the crop in this area is grown for green manuring and with irrigation, planting should be made from the middle of August to the middle of September.

When planting for hay purposes in California without irrigation, purple vetch should be sown on fallow land in the fall, before the winter rains begin.

Purple vetch has been tested but little in the Southeastern States, and the best time for planting it has not been determined, but fall planting seems most likely to be successful.

When sown for green-manuring, seed, or hay purposes, purple vetch should be seeded at the rate of 60 to 80 pounds per acre. Under favorable conditions a smaller quantity of seed may be used, but ordinarily at least 60 pounds will be found essential. When seeding with grain for hay purposes, the mixture should contain about 40 pounds of purple-vetch seed per acre and about half the amount of grain used when seeding grain alone.

INOCULATION.

In the Pacific Coast States, where common vetch is almost always naturally inoculated, the necessary bacteria apparently being present in the soil, it is not necessary to inoculate for purple vetch. In the Atlantic Coast States and the States bordering the Gulf of Mexico inoculation is essential in most cases when land is seeded to vetch for the first time. Elsewhere in the United States it is advisable, if not essential, that the soil be inoculated in seeding for the first time. Inoculation is more difficult to secure on poor soil than in richer or more loamy soils containing a higher percentage of organic matter. In seeding land to purple vetch for the first time, inoculation can be made more certain if a heavy application of manure is made the preceding season. One method of inoculation is by scattering soil from a field where vetch has been grown with success. The soil should be broadcasted at the rate of 250 to 500 pounds to the acre and harrowed in at once. Inoculation may be also secured by mixing the soil with the seed at the time of seeding. In this way but little soil will be needed to inoculate a large area, and practically no extra time or labor is required. Where inoculated soil is not available, pure cultures may be used. The same germ produces nodules on common vetch, hairy vetch, and purple vetch, so that cultures used for the first two varieties may be used for the last.

METHOD OF SEEDING.

Purple-vetch seed may be sown either broadcast or by drilling. Drilling has the advantage of being more economical, but often a drill is not available or can not be secured conveniently, and in this case broadcasting can be done with very satisfactory results. In sections where common vetch is now used extensively, opinion differs as to the relative merits of drilling and broadcasting. It is the contention of some that broadcasting gives results equally as good as drilling, but it seems to be the belief of more experienced farmers that drilling not only saves seed, but also insures a better stand by reason of less winterkilling in severe seasons. Experimental plantings have given better results from drilled plats, and this apparently has been due to better germination and less winterkilling.

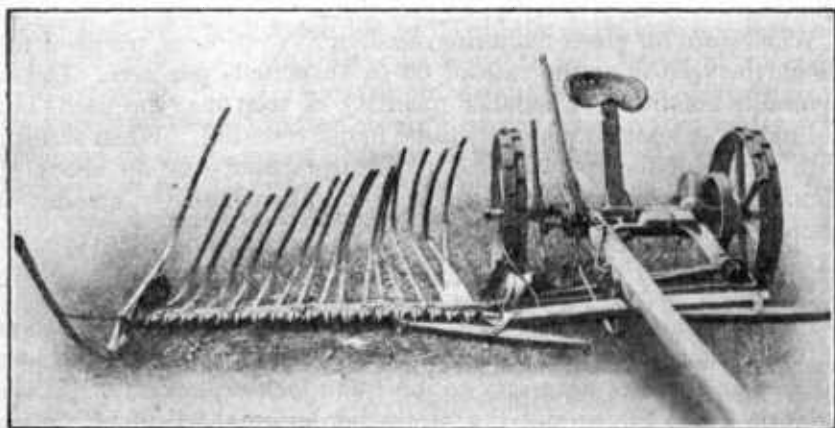


FIG. 4.—An ordinary mower with a swather attachment used in cutting vetch.

USE OF LIME AND GYPSUM.

In the Southern States and in Washington and Oregon west of the Cascade Mountains, it is the common practice to use lime and gypsum in connection with the growing of common vetch. The requirements of purple vetch with regard to lime are the same as those of common vetch. While the general practice in Oregon has given very favorable results with common vetch, experimental work at Corvallis, Oreg., showed only a slight increase of seed or hay from the use of lime or gypsum. The better drained lands of western Oregon and western Washington perhaps require little, if any, lime, but on the lower and less well drained lands lime will give very satisfactory results. Under such conditions an application of from 1 to 2 tons per acre is recommended. Gypsum can be used to advantage on practically all lands. From 100 to 200 pounds per acre should be applied.

HARVESTING FOR HAY.

Purple vetch should be cut for hay during the period from full bloom to the formation of the first pods. It can be satisfactorily cut with an ordinary mower with a swather attachment (fig. 4). After cutting, the vetch should be bunched with a horserake and then shocked. This handling should always be done before the leaves are dry. The vetch should be allowed to cure in the shocks for several days and hay caps used, if possible, in regions where rainy weather is feared. Where a swather is not used, the cutting is considerably more difficult. In either case the vetch should be allowed to lie one day before shocking. Purple vetch yields from $1\frac{1}{2}$ to $3\frac{1}{2}$ tons of hay to the acre, an average yield being about $2\frac{1}{2}$ tons.



FIG. 5.—A mower with a swather attachment in operation.

HARVESTING FOR SEED.

Purple vetch should be cut for seed soon after the lower pods are ripe, at which time the upper pods will be mature and the plant will be carrying a maximum quantity of seed. Later cutting occasions more dropping of pods, while earlier cutting results in a considerable percentage of immature seed. Purple vetch is less exacting as to the time of cutting than common vetch, as the seed shatters less readily, but when purple vetch becomes overripe the seed shatters more or less, and often the pods drop from the vine without bursting. An ordinary mower can be used in cutting purple vetch, but this is not entirely satisfactory, as much of the seed is lost in raking, which is necessary when a common mower is used. An ordinary grain binder can be used with good results, especially when the vetch is short or when it is grown with a support crop, such as oats. When

harvested in this manner the crop should be put in shocks, following the practice with grain, and allowed to remain until thrashed. The most satisfactory way of harvesting purple vetch, however, is to use an ordinary mower with a swather attachment. The swather, which is attached to and behind the sickle bar, rolls the vetch in a swath to the outside and leaves the way clear to cut the next swath. (Figs. 5 and 6.) Whatever method is used in cutting, the vetch should be put immediately into shocks and allowed to remain there until thrashed. The most important rule in the harvesting of vetch seed is to handle the crop as rapidly and as little as possible.



FIG. 6.—A crop cut with an ordinary mower with a swather attachment.

THRASHING.

Purple vetch can be thrashed with an ordinary thrashing machine (fig. 7). It thrashes slowly and consequently the expense is high. On account of its nonshattering character the seed is more difficult to remove from the pods than that of common vetch. However, this is no serious objection, experience in handling this crop indicating that it can be thrashed at practically the same expense as common vetch. Usually 20 to 25 cents a bushel is charged for thrashing common vetch, and the cost is about the same whether the vetch is thrashed by the bushel or a thrashing machine is hired by the day. When vetch and oats or other small grain are grown in mixture and cut with a binder the thrashing is usually done for 10 cents a bushel. However, this means that the additional cost of thrashing the small grain brings the price of thrashing the vetch seed up to practically the figure charged for thrashing vetch alone.

CLEANING SEED.

Purple-vetch seed is about the same size as common-vetch seed, which means that it is practically the size of wheat. The separation of purple-vetch seed from wheat or hull-less barley is therefore quite difficult, and it is only with special machinery that such separation can be accomplished. Other small grains, such as oats, rye, and common barley, can be separated from purple-vetch seed quite easily with any of the common seed-cleaning devices used for the small grains (fig. 8). The separation of most weed seeds found in the vetch sections of the United States can usually be made with the ordinary separating devices now in common use.

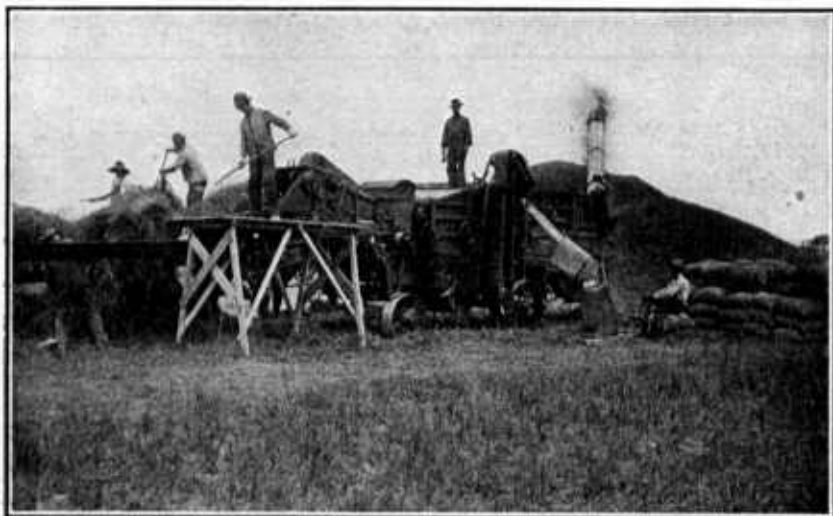


FIG. 7.—Thrashing vetch seed with an ordinary thrasher.

YIELD OF SEED.

Purple vetch varies considerably in the yield of seed to the acre. A yield of 5 bushels is low, and yields of 20 to 25 bushels are near the maximum. An average yield is probably from 10 to 12 bushels per acre, or about the same as common vetch. In experimental plats at Corvallis, Oreg., yields ranging from nothing to 29 bushels per acre have been secured. The cases of total failure were due to the winterkilling of fall plantings in the winter of 1914-15. In commercial plantings in western Oregon and western Washington, the yields have ranged from nothing to 20 bushels per acre, the failures being due to winterkilling.

INSECTS IN RELATION TO POLLINATION.

The pollen of the purple-vetch flower is maturing just before the flowers open. In experiments to determine whether or not cross-pollination is essential to seed setting it has been determined that

plants covered with tarlatan netting and protected from insects produce practically as good a seed crop as plants in the open, while plants in paper bags set no seed. From this, it seems that visitation by large insects is not essential, while small insects may be quite beneficial. However, many of the larger insects, such as honeybees, bumblebees, and sweat bees, visit the purple-vetch flowers. Honeybees and small bumblebees in working the flowers do not trip them or force the staminal column through the keel. The insect forces its proboscis between the calyx tube and standard and wings, but this does not effect tripping. Large bumblebees trip the flowers. The weight of their bodies is sufficient to force the staminal column through the keel, but this again returns or springs back as soon as the bumblebee leaves the flower.

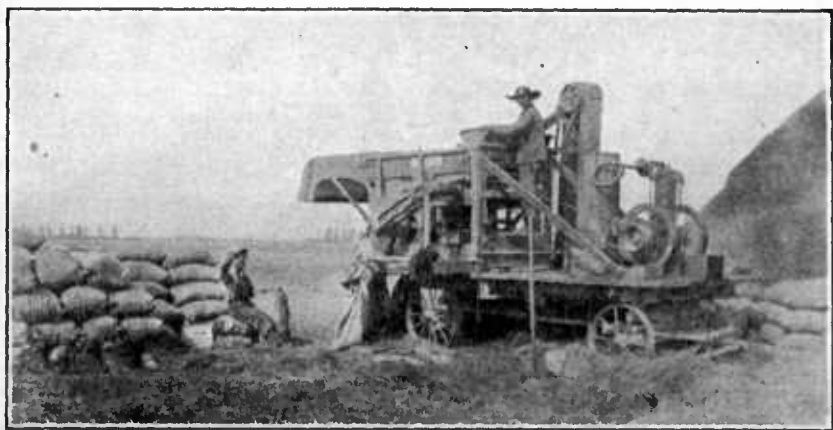


FIG. 8.—Cleaning vetch seed with a power cleaner.

While there are no definite data regarding the value of purple vetch as a honey-producing plant, it would seem from the fact that vetch fields are so generally visited by honeybees that a large amount of nectar probably is produced.

INJURIOUS INSECTS.

There is only one insect that has caused any serious damage to the purple-vetch crop. This is the aphid which also does serious damage to the field pea and common vetch. In growing field peas, common vetch, and other leguminous crops in comparison with purple vetch, it has been noted that the aphid does much less injury to the purple vetch than to the other crops. This has special significance both in growing the crop for green manure and for seed. In seasons favorable to aphid development, damage has been done to the vetch-seed crop by the insects sapping the seed pods and thus preventing their development; also, in growing the crop for hay or green manure the yield has been reduced.